



## EMIR PROPOSAL

RÉSEAU NATIONAL D'ACCÉLÉRATEURS POUR LES ÉTUDES DE MATÉRIAUX SOUS IRRADIATION

Beam time period: February 2017, January 2018 (under cover of the schedule of requested facility).

Deadline for submission: **November 18<sup>th</sup>, 2016**

<http://emir.in2p3.fr>

**\* All the fields marked with a star are required.**

All the form has to be filled with the Arial .12 size.

This form has to be upload on the EMIR web site in **.PDF ONLY**.

**Proposal Title \***:

YOUR PROJECT TITLE

<b>Project Leader * :</b>
<b>Deputy Spokesperson (if different from the project leader):</b>
<b>Phone*:</b>
<b>E-mail*:</b>
<b>Address*:</b>

Does this experiment benefit from an industrial grant?	<b>NO:</b>		<b>YES:</b>	
Which one? :				
Does this experiment benefit from another grant (ANR, NEEDS, Europe...)?	<b>NO:</b>		<b>YES:</b>	
Which one? :				

<i>List of the participants, email and complete address*:</i>		
<b>Name</b>	<b>email</b>	<b>Laboratory</b>
Project leader		
Project associates		
Project associates		
Project associates		

*add more line if needed*

The following billing coordinates will be useful for any JANNuS (Orsay or Saclay) experiments, as a financial participation is required per experiment.

<b>Billing coordinates*</b>	
Name*:	
Phone*:	Fax:
E-mail*:	
Billing postal address*:	

**Please note that you must contact the facility(ies) for which you are applying before submission**

Check below the requested EMIR facility(ies) (one form by scientific project even if the request is for multiple facilities) and the number of days requested for each site (or time units (UT) for CIMAP).

Is this a new experiment?	<b>YES:</b>	<b>NO:</b>	Continuation of EMIR project n°: xx-xxxx
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	Check sites involved	Number of days or UTs requested
<b>CSNSM</b>		
<b>LSI</b>		
<b>CIMAP</b>		
<b>SRMP</b>		
<b>SRMA</b>		
<b>CEMHTI</b>		

## PROPOSAL STATEMENTS\*

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### Scientific informations : (2 pages max)

- Context and motivations of the scientific project: (~½ page max) :
- Project description: objectives and new aspects (1 page max with references and figures)
- If applicable, summary of your previous experiments performed at the EMIR facility you request, or another EMIR or similar facilities (~½ page max) Please add any reference related to previous experiments performed at EMIR.

### Technical informations : (1 pages max)

- Particular requirements: ion beam and experimental conditions, dimension of the investigated samples, estimation of time for irradiation, time for characterization, surface to be irradiated, energy degraders, thermal treatment.
- Discuss the level of local technical support needed to perform your experiment: Include also discussion of modification/development of equipment if necessary (sample-holder...) Experimental Procedure: Estimation of time for irradiation/implantation, time for characterisation, type of experiments: numbers of run, Dynamic observation or number of step.

**Report of the last beamtime : (~½ page max) if it is continuity of previous EMIR project.**

**PROPOSAL STATEMENTS\***

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**PROPOSAL STATEMENTS\***

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## IMPORTANT :

- 1) All publications containing results from experiments performed at EMIR have to mention the EMIR Network, and for projects performed in collaboration with local contacts, publications should include these local contacts as co-authors.
- 2) The submission of this proposal implies that you certify that the given information is true and complete. You accept to **include the following sentence in your publications** on the results obtained (*add the adequate sentence(s)*)

**CSNSM JANNuS-Orsay:** « Experiment performed at the CSNSM facility : JANNuS-Orsay (CSNSM, Univ Paris-Sud, CNRS/IN2P3, Orsay, France). This experiment was supported by the EMIR French accelerator network. » **Please note that local contacts have to be added as co-authors.**

**SRMP JANNuS-Saclay:** « experiment done at JANNuS-Saclay (Joint Accelerators for Nanoscience and Nuclear Simulation), CEA, France and supported by the French Network EMIR ». For projects performed in collaboration with local contacts, **publications should include the local contacts as co-authors.**

**LSI:** « experiment done at LSI (Laboratoire des Solides Irradiés), Palaiseau, France and supported by the French Network EMIR ». For projects performed in collaboration with local contacts, **publications should include the local contacts as co-authors.**

**CEMHTI:** « experiment done at CEMHTI (Conditions Extrêmes et Matériaux: Hautes Températures et Irradiations, Orléans, France) and supported by the French Network EMIR ». And to associate the people from **CEMHTI team who contribute to the success of this experiment into the derived publications.**

**GANIL:** « experiment performed at Grand Accélérateur National d'Ions Lourds (GANIL) Caen, France, and supported by the French Network EMIR ». For projects performed in collaboration with local contacts, **publications should include the local contacts as co-authors.**

**SRMA EM7 HVEM:** « experiment done using the EM7 HVEM at CEA Saclay, France and supported by the French Network EMIR » and for projects performed in collaboration with local contacts, **publications should include the local contacts as co-authors.**

**PLEASE in the next pages,  
KEEP ONLY THE PAGE FOR THE CONCERNED FACILITIES**

# Materials under Irradiation at CSNSM (JANNuS-ORSAY)

A financial participation is requested



**Beware** : The proposals without in situ characterization must be sent directly at : [dem-faisceau@csnsm.in2p3.fr](mailto:dem-faisceau@csnsm.in2p3.fr). They will not be examined by the EMIR Program Advisory Committee.

Please, before sending your proposal, contact the CSNSM at : [emir-contact@csnsm.in2p3.fr](mailto:emir-contact@csnsm.in2p3.fr)

Choose below the equipments to be used  
(See <http://emir.in2p3.fr/Equipment-description.43>):

**The beamtime costs 2000 euros per experiment  
(reduced fee valid for EMIR accepted proposals)**

Experiment	yes/no	nbr of days
JANNuS (ARAMIS + IRMA + TEM):		
JANNuS (ARAMIS + TEM):		
JANNuS (IRMA + TEM):		
ARAMIS + on line instrumentation:		
<b>Total number of runs requested (1 run = 5 days monday to friday)</b>		

General information about your beamtime :

When will you be ready to run?
Excluded periods

<sup>1</sup> The date of experiment will be sent to you after acceptance of your proposal, taking into account the excluded periods and the dates you will be ready to run.

questions	Name	laboratory/ adress
Who you have contacted at CSNSM		CSNSM
Your(s) Microscopist(s)		
Local contact if any from a previous beamtime		CSNSM

<sup>2</sup>. At JANNuS-ORSAY, each experiment with the TEM requires the presence of an experienced microscopist, presence which must be planned by the project leader.

**Accelerators Parameters for TEM in-situ:**

**Required beam ARAMIS+IRMA+TEM :**

See <http://jannus.in2p3.fr/spip.php?rubrique14> & <http://emir.in2p3.fr/Equipment-description,43>

ions	Energy keV - MeV	Fluence (ions/cm <sup>2</sup> )	Flux min (ions/cm <sup>2</sup> .s)	Temperature

**Required beam for ARAMIS+TEM (Ion energy : 0.5 – 15 MeV)**

See <http://jannus.in2p3.fr/spip.php?rubrique16>

ions	Energy (MeV)	Fluence (ions/cm <sup>2</sup> )	Flux min (ions/cm <sup>2</sup> .s)	Temperature

**Required beam for IRMA+TEM (Ion energy 10 – 570 keV) :**

See <http://jannus.in2p3.fr/spip.php?rubrique17>

ions	Energy (keV)	Fluence (ions/cm <sup>2</sup> )	Flux min (ions / cm <sup>2</sup> .s)	Temperature

**TEM equipment required :**

**Indicate the holder required for your beamtime**

Double tilt holder RT:		Single tilt holder RT:		Tilt rotation holder RT:	
Double tilt heating holder:		N2 Double tilt holder:			

**TEM equipments required for your beamtime:**

Wide angle camera:		Video recorder:		EFTEM:	
Bottom mount camera:		GIF:		EDX:	
Films:		STEM:			



**Accelerators Parameters for on line instrumentation :**

**Required beam:** See <http://emir.in2p3.fr/Equipment-description,43>

Ions	Energy (keV or MeV)	Fluence (ions/cm <sup>2</sup> )*	Flux min (ions / cm <sup>2</sup> .s)	Temperature

<b>Samples</b>	Material (size, shape):
Total number of samples:	Possibility to irradiate several samples simultaneously (samples / run):

**Indicate the holder**

Multi –sample holder RT:		Cooled goniometer (LN2):		User provided (enclose description):
Heating holder:		Heating goniometer:		

**Laboratory equipments necessary during the scheduled time:**

On line IBA:		Resistivity measurement:		Other:
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**Add here any comment and/or your provisional schedule and technical details of your beam time (material (size, shape...), ...) :**



# LSI: SIRIUS (école polytechnique)

**Required beam:** See <http://emir.in2p3.fr/Equipment-description.49>

Energy* MeV	Current ( $\mu$ A)*	Irradiation surface* (cm <sup>2</sup> )	Temperature*

**Total number of days requested (from 2 to 5):**

**Indicate the holder \***

Low temperature:		High Fluence:	
High surface:		In situ measurements:	

**Laboratory equipments necessary during the scheduled time**

Annealing equipments:		Luminescence:		TEM:	
EPR:		Absorption:		Samples preparation:	

What date will you be ready to run? :

Excluded periods :

<sup>2</sup> The date of experiment will be sent to you after acceptance of your proposal, taking into account the excluded periods and the dates you will be ready to run.



# MATERIALS UNDER IRRADIATION AT GANIL

## CIMAP (CAEN)



*Civil*

plateforme d'accueil auprès du GANIL

- \* All the fields marked with a star are required.
- \* Check below the facilities to be used

(see <http://emir.in2p3.fr/spip.php?rubrique35> ):

<b>IRRSUD:</b>	
<b>Medium energy:</b>	

### CIMAP: Medium Energy Ion Beam (4 – 13 MeV/A)

Required beam: see <http://emir.in2p3.fr/spip.php?rubrique35>

Ions	Energy MeV/nucleon	Flux (ions/(cm <sup>2</sup> .s))	Required time (1 UT = 8 hours)

Splitting the beam time in several periods:	<b>NO:</b>		<b>YES:</b>		Minimum number of UT per period :
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**Beam line** (Check below)

IRASME:		Multipurpose line:	
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Specific requirements for data acquisition:

<b>Irradiation without on-line characterisation measurements</b>					
On the classical sample holder:		With gas exchange:		At high temperature (600°C):	
:		:		N <sub>2</sub> cryostat under vacuum:	

<b>Irradiation with on-line characterisation measurements</b>					
IR or UV/Vis absorption spectroscopy at RT:				X-Ray diffraction (CHEXPIR):	
IR or UV/Vis absorption spectroscopy at 10K:				Gas analysis (IR or MS):	

Time required to set-up:
Time required to dismantle the experiment:

<b>Laboratory equipment necessary during the scheduled time</b>					
UV-visible Spectrometer:		Infrared Spectrometer:			
Near-Field Microscope:		X-ray Diffraction:			

What date will you be ready to run? :
Excluded periods:

**CIMAP: IRRSUD (0.3 – 1 MeV/A)**Required beam: see <http://emir.in2p3.fr/spip.php?rubrique35>

Ions	Energy MeV/nucleon	Flux (ions/(cm <sup>2</sup> .s))	Required time (1UT=8 hours)

Could you accept a beam slightly different from those listed (atomic number or energy)?

**NO:****YES:**

Splitting the beam time in several periods

**NO:****YES:**

Minimum number of UT per period:

Specific requirements for data acquisition :

***Irradiation without on-line characterisation measurements***

On the classical sample holder:	N2 cryostat under vacuum:	At high temperature (600°C):
		At high temperature (1100°C): only for nuclear materials

***Irradiation with on-line characterisation measurements***

IR or UV/Vis absorption spectroscopy at RT:	X-Ray diffraction (ALIX):
IR or UV/Vis absorption spectroscopy at 10K:	

Time required to set-up:

Time required to dismantle the experiment:

***Laboratory equipment necessary during the scheduled time***

UV-visible Spectrometer:	Infrared Spectrometer:
Near-Field Microscope:	X-ray Diffraction:

What date will you be ready to run?:

Excluded periods:

# Materials under Irradiation at SRMP (SACLAY)



## SRMP: Triple beam facility (JANNuS - Saclay) Financial participation will be request

Required beams: See <http://emir.in2p3.fr/Equipment-description>

Ions*	Energy* MeV	Current min (nAe)	Fux* min (ions/ (cm <sup>2</sup> .s))	Dose* (ions/cm <sup>2</sup> )

Splitting the beam time in several periods:

NO:

YES:

Minimum time per period :

**Total number of days requested (1/2 to 5):**

**Samples:** (Material, size, shape): \*

Total number of samples: \*

Possibility to irradiate several samples simultaneously (samples / run):

### Experiment chamber:

Triple (or dual) beam:

IBA (only if combined with irradiation):

*In situ* Raman:

Single beam irradiation :

User provided (enclose description):

Specific requirements for data acquisition:

### Experimental conditions:\*

*Without on-line characterisation measurements*

Heating-cooling sample holder:

Room temperature:

High temperature T = °C

IBA sample holder:

Liquid N2 temperature:

Vacuum level requested:

Time required to set-up:

Time required to dismantle the experiment:

What date will you be ready to run?:

Excluded periods:

**Laboratory equipment necessary during the scheduled time (extra cost can be charged):**

Off-line IBA:

*Ex situ* Raman:

Other:

**JANNuS-SACLAY:** *Particular requirements: ion beam and experimental conditions, dimension of the investigated samples (~½ page)*  
*Include complementary precisions about experimental conditions (estimation of time for irradiation, time for characterisation, surface to be irradiated, energy degraders, thermal treatment, etc)*

The submission of this proposal implies that you certify that the given information is true and complete. You accept to include the following sentence in your publications on the results obtained at SRMP JANNUS-Saclay:

« *Experiment done at JANNUS-Saclay (Joint Accelerators for Nanoscience and Nuclear Simulation), CEA, France and supported by the French Network EMIR* ».

For projects performed in collaboration with local contacts, publications should include these local contacts as co-authors.

## EM7 HVEM at SRMA (SACLAY)



See <http://emir.in2p3.fr/10-Equipment-description>

Energy* MeV	Electron flux (e- / (cm <sup>2</sup> s))*	Fluence* (e-/cm <sup>2</sup> )	Temperature*

**Total number of days requested:**

Splitting the beam time in several periods:	<b>NO</b>	<b>YES</b>	Minimum time per period :
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**Samples\***

Material\*:

Total number of samples\*:

**Indicate the holder\***

Single tilt Heating holder:

Single tilt Heating holder for Atom Probe specimens:

Double tilt Cooling holder:

**Laboratory equipment necessary during the scheduled time:**

Bottom Mount CCD Gatan Camera:



# MATERIALS UNDER IRRADIATION AT CEMTHI (ORLÉANS)



\* Check below the facilities to be used \* (see <http://emir.in2p3.fr>):

<b>Cyclotron:</b>	
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<b>Pelletron:</b>	
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The New Pelletron accelerator will be available, likely in February 2015.

See <http://emir.in2p3.fr/Equipment-description,29>

## CEMTHI : Cyclotron

H<sup>+</sup> (12-34 MeV), H<sub>2</sub><sup>+</sup> (5-25 MeV), D<sup>+</sup> (5-25 MeV), and <sup>4</sup>He<sup>++</sup> (10-45 MeV),  
fast neutrons (mean energy 8-30 MeV)

Required beams: see <a href="http://www.cemhti.cnrs-orleans.fr/Instruments/Accelerateurs/Default.aspx">http://www.cemhti.cnrs-orleans.fr/Instruments/Accelerateurs/Default.aspx</a>				
Particles*	Energy* MeV	Current min (nA)	Flux* min (ions/ cm <sup>2</sup> .s))	Fluence* (ions/cm <sup>2</sup> )

<b>Total number of days requested:</b>				
Splitting the beam time in several periods:	<b>NO</b>	<b>YES</b>	Minimum time per period :	

<b>Samples</b>	Total number of samples*:
Possibility to irradiate several samples simultaneously (samples / run):	

Experiment chamber		
RISE (Room-temperature Irradiation SEt-up):		CH <sub>3</sub> ILDS Homogeneous Implantation at Large Depth in Sample) with or without stress:
DIAMANT (-120 to 1200°C):		User provided (enclose description):

\*the development and the use of this irradiation set-up are carried out in collaboration with PSI (Paul Scherrer Institute, Switzerland)

Specific requirements for data acquisition:

Experimental conditions*:		
<i>Without on-line characterisation measurements:</i>		
Under stress:	Room temperature:	High temperature T = °C
Vacuum:	Low temperature T= °C	

Vacuum level requested:

Time required to set-up:

Time required to dismantle the experiment:

Laboratory equipment necessary during the scheduled time:		
Raman in-situ:	Gamma Spectrometry:	
Other:		

What date will you be ready to run? :

Excluded periods:

**CEMHTI : Pelletron**H<sup>+</sup>, H<sub>2</sub><sup>+</sup>, D<sup>+</sup>, D<sub>2</sub><sup>+</sup>, <sup>3</sup>He<sup>+</sup> and <sup>4</sup>He<sup>+</sup> from 0,4 to 3 MeV**Required beams:** see <http://www.cemhti.cnrs-orleans.fr>

Ion*	Energy* MeV	Current min (nAe)	Flux* min (ions/(cm <sup>2</sup> .s))	Fluence* (ions/cm <sup>2</sup> )

Splitting the beam time in several periods	<b>NO:</b>	<b>YES:</b>	Minimum time per period :
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<b>Samples</b>	Total number of samples*:
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Possibility to irradiate several samples simultaneously (samples / run):
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**Experiment chamber**

ECLAIR (Experiment Chamber for Large Area Irradiation at Room -temperature):	
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DIADDHEM (-120°C° to 1200°C):		User provided (enclose description):
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Specific requirements for data acquisition:
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**Experimental conditions\***

<i>Without on-line characterisation measurements:</i>			
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Room temperature:		High temperature T = °C	Low temperature T = °C
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Vacuum:	
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Vacuum level requested:
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Time required to set-up:
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Time required to dismantle the experiment:
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**Laboratory equipment necessary during the scheduled time**

On-line IBA:	Other:
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What date will you be ready to run? :
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Excluded periods:
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